

**DRAFT**

MTS-3181US

- 3 -

**REMARKS**

Claims 1, 4, 5, 40, 41, 43, 51, 53, 54 and 56 have been allowed.

Claims 52, 55, 57, 59, 60, 65-70, 72-75 and 77-80 have been objected to.

Claims 3, 39, 42, 44-50, 58, 61-64, 71, 76, 81 and 82 stand rejected.

**Section 103 Rejections:**

Claim 3 has been rejected as being obvious in view of Michaelis and Tsukada. Applicants respectfully submit that this rejection is overcome for the reasons set forth below.

Amended claim 3 now includes the following feature which is not suggested by the cited references, namely:

**at least one of the electrodes is embedded in the partition wall.**

This feature is described in the specification, for example, at page 36, lines 15-28 and shown in FIGS. 3 and 8. As shown in FIG. 3, **electrode 17a is embedded in partition wall 4**. As shown in FIG. 8, **electrode 37b is embedded in partition wall 4**.

Michaelis, on the other hand, in FIG. 10(b) discloses first and second partition walls 603 (as indicated by the Examiner). Each partition wall includes two electrodes 619 and 621 (shown in FIG. 9(a)). **These electrodes, however, are not embedded in each partition wall.** Instead, electrode 619 is exposed to ink pressure chamber 613 and electrode 621 is exposed to buffer chamber 615. Michaelis is thus different from amended claim 3.

Tsukada discloses a piezoelectric device that includes upper electrode 18 and lower electrode 14, as shown in FIG. 7. Tsukada does not have any partition

**DRAFT**  
MTS-3181US

- 4 -

wall that is similar to applicants' first and second partition walls recited in claim 3. **Tsukada also does not disclose electrodes embedded in a partition wall.** (Tsukada is cited by the Examiner for sintering of a block). Thus, Tsukada is different from amended claim 3.

Hiraishi discloses electrodes 4c1 and 4c2 in FIG. 1, which are exposed to barrier 2c. **Hiraishi, therefore, does not disclose electrodes embedded in a partition wall.** Hiraishi is, thus, different from amended claim 3.

Since none of the above references discloses or suggests an electrode embedded in a partition wall, amended claim 3 is now in condition for allowance.

As an aside, the Examiner asserts that Tsukada discloses a piezoelectric block that is an integrally sintered one piece block structure. Applicants respectfully disagree with this assertion by noting that Tsukada, at column 3, lines 6-7, discloses a method of fabricating piezoelectric layer 16 (FIGS. 8A-8C), which is a layer deposited on top of electrode layer 14 (column 9, lines 63-67). **Other layers in block 10 (FIG. 7) are not integrally sintered.** Thus, block 10 of Tsukada is not an integrally sintered one piece block structure.

Amended claim 3 is now in condition for allowance. Dependent claims 39, 42, 44-50, 52, 55, 57-80, which depend from amended claim 3, are also in condition for allowance (claim 64 has been cancelled).

Claim 81 has also been amended to include the above newly added feature of amended claim 3, namely:

**at least one of the electrodes is embedded in the partition wall.**

Amended claim 81, as well as dependent claim 82, is now in condition for allowance for the same reasons set forth for amended claim 3.

MTS-3181US

- 5 -

**DRAFT**CONCLUSION

Claims 1, 4, 5, 40, 41, 43, 51, 53, and 54-56 have been allowed.

Claims 3, 39, 42, 44-50, 52, 55, 57-63, and 65-82 are in condition for allowance.

Respectfully Submitted,

RATNER & PRESTIA

---

Allan Ratner, Reg. No. 19,717  
Jack J. Jankovitz, Reg. No. 42,690  
Attorneys for Applicants

JJJ/mc

Dated: June 5, 2002

Enclosures: Amended Abstract  
Version with markings to show changes made

Suite 301  
One Westlakes, Berwyn  
P.O. Box 980  
Valley Forge, PA 19482-0980  
(610) 407-0700

The Assistant Commissioner for Patents is hereby authorized to charge payment to Deposit Account No. 18-0350 of any fees associated with this communication.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail, with sufficient postage, in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231 on:

---

---

**DRAFT**

**DRAFT**

MTS-3181US

- 6 -

***VERSION WITH MARKINGS TO SHOW CHANGES MADE*****IN THE CLAIMS:**

1               3. (As Amended) An ink-jet recording head comprising at least  
2 one piezoelectric block having (a) first and second ink pressure chambers, each  
3 pressure chamber communicating with a nozzle for ejecting ink supplied from an ink  
4 supply, (b) first and second partition walls, each partition wall serving as a driving  
5 portion for one of the two ink pressure chambers, each partition wall including a  
6 piezoelectric element and at least two electrodes for driving said piezoelectric  
7 element, (c) a pressure buffer chamber, and (d) first and second fixed walls,

8               wherein at least one of said electrodes is embedded in said partition  
9 wall,

10               [wherein] the first ink pressure chamber, the first partition wall, said  
11 pressure buffer chamber, the second partition wall and the second ink pressure  
12 chamber are arranged in sequence along a thickness direction of said piezoelectric  
13 block,

14               said first fixed wall disposed adjacent to said first ink pressure  
15 chamber and said second fixed wall disposed adjacent to said second ink pressure  
16 chamber, and

17               the piezoelectric block is an integrally sintered one piece block  
18 structure.

1               68. (Amended) The ink-jet recording head as set forth in claim  
2 [61] 3, wherein at least one electrode is further interposed between said two  
3 electrodes.

1               81. (Amended) An ink-jet recording head comprising at least one  
2 piezoelectric block having (a) first and second ink pressure chambers, each pressure  
3 chamber communicating with a nozzle for ejecting ink supplied from an ink supply,  
4 (b) first and second partition walls, each partition wall serving as a driving portion for  
5 one of the two ink pressure chambers, each partition wall including a piezoelectric

MTS-3181US

- 7 -

6 element and at least two electrodes for driving said piezoelectric element, (c) a  
7 pressure buffer chamber, and (d) first and second fixed walls,

8                   wherein at least one of said electrodes is embedded in said partition  
9 wall,

10                  [wherein] the first ink pressure chamber, the first partition wall, said  
11 pressure buffer chamber, the second partition wall and the second ink pressure  
12 chamber are arranged in sequence along a thickness direction of said piezoelectric  
13 block,

14                  said first fixed wall disposed adjacent to said first ink pressure  
15 chamber and said second fixed wall disposed adjacent to said second ink pressure  
16 chamber, and

17                  surfaces of the two electrodes are oriented perpendicular to the  
18 thickness direction, the driving portion is polarized in the thickness direction and  
19 perpendicular to the surfaces of the electrodes.